PARTICIPANT GUIDE

Introduction to NCD Epidemiology

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Introduction to NCD Epidemiology

**Learning Objectives**

- At the end of the training, you will be able to describe how you will use epidemiology to address a public health problem.

**Estimated Completion Time**

- 2 hours, 25 minutes (*110 minutes interactive presentation; 35 minutes Skill Assessment*)

**References and Resources**

- McKenna et al. 1998. Current Issues and Challenges in Chronic Disease Control. In: Chronic Disease Epidemiology and Control. Washington:
# Learning Objective
At the end of the training, participants will be able to describe how to use epidemiology to address a public health problem.

# Lesson Overview
- Basic terminology
- Comparison of non-communicable diseases and communicable diseases
- Definition and approaches of epidemiology
- Public health management cycle
- Core functions of epidemiology

# Non-Communicable Disease (NCD): Definition
Noncommunicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression.
**Non-Communicable Disease (NCD): Definition (cont.)**

- Chronic conditions are characterized by the following:
  - Do not result from an (acute) infectious process
  - Are “not communicable”
  - Cause premature morbidity, dysfunction, and reduced quality of life
  - Usually develop and progress over long periods,
  - Often initially insidious
  - Once manifested there is usually a protracted period of impaired health

**Non-Communicable Disease (NCD): Extended Definition**

In some definitions, NCDs also include:

- Chronic mental illness
- Injuries, which have an acute onset, but may be followed by prolonged convalescence and impaired function

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**Key Point:** There are a variety of opinions about this definition in the field and there is not 100% agreement; for example, some would argue that HIV is a chronic condition.

**Types of NCDs**

- Cardiovascular disease (Coronary heart disease, Stroke)
- Cancer
- Chronic lung disease
- Diabetes
- Chronic neurologic disorders (Alzheimer’s, dementias)
- Arthritis/Musculoskeletal diseases
Leading Causes of Attributable Global Mortality and Burden of Disease, 2004

<table>
<thead>
<tr>
<th>Attributable Mortality</th>
<th>Attributable DALYs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High blood pressure</td>
<td>1. Childhood underweight</td>
</tr>
<tr>
<td>2. Tobacco use</td>
<td>2. High blood pressure</td>
</tr>
<tr>
<td>3. High blood glucose</td>
<td>3. Unsafe sex</td>
</tr>
<tr>
<td>4. Physical inactivity</td>
<td>4. Unsafe water, sanitation, hygiene</td>
</tr>
<tr>
<td>5. Overweight and obesity</td>
<td>5. High blood glucose</td>
</tr>
<tr>
<td>6. High cholesterol</td>
<td>6. Indoor smoke from solid fuels</td>
</tr>
<tr>
<td>7. Unsafe sex</td>
<td>7. Tobacco use</td>
</tr>
<tr>
<td>8. Alcohol use</td>
<td>8. Physical inactivity</td>
</tr>
<tr>
<td>9. Childhood underweight</td>
<td>9. Sudden infant death</td>
</tr>
<tr>
<td>10. Indoor smoke from solid fuels</td>
<td>10. High cholesterol</td>
</tr>
</tbody>
</table>

- 59 million total global deaths in 2004
- 1.5 billion total global DALYs in 2004

Characteristics of NCDs
- Complex etiology (causes)
- Multiple risk factors
- Long latency period
- Non-contagious origin (non-communicable)
- Prolonged course of illness
- Functional impairment or disability
- Incurability
- Insidious onset

Risk Factor

“An aspect of personal behavior or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition.”
**Key Point:** If you have an intervention for physical inactivity and tobacco use you can make progress on four key NCDs. You don’t need to plan separate interventions for each NCD or each risk factor.
**Communicable Disease:**

**Definition**

- An infectious disease transmissible (as from person to person) by direct contact with an affected individual or the individual's discharges or by indirect means (as by a vector)
- Examples:
  - Measles
  - Dengue
  - Typhoid

**Non-Communicable Diseases vs Communicable Diseases**

- How do they differ regarding:
  - Infectiousness?
  - Risk of Disease?

**What is Epidemiology?**
**Epidemiology: CDC Definition**

“The study of the distribution and determinants of health-related states in specified populations, and the application of this study to control health problems.”

- Distribution
- Determinants
- Health-related states
- Specified population
- Application

**Epidemiology: CDC Definition Distribution**

*Distribution:* Occurrence of cases by time, place, and person

*Example:* According to a study of deaths in Country X in 2008, 1,034 cervical cancer deaths occurred among women between the ages of 45-54.

**Epidemiology: CDC Definition Determinants**

*Determinants:* All the causes and risk factors for the occurrence of a disease, including physical, biological, social, cultural, and behavioral factors

*Example:* Smoking was a risk factor or determinant for the greater number of cancer deaths among women ages 45-64 in Country X.

**Key Point:** Think of determinants as the “how” and the “why.”
Epidemiology: CDC Definition
Health-Related States

*Health-related states*
- Diagnosis of a specific disease or cause of death
- Health-related behavior (e.g., smoking, taking prenatal vitamins)
- **Example:** According to the 2008 study in Country X, 1,034 cervical cancer deaths occurred among women between the ages of 45-54.

Epidemiology: CDC Definition
Specified Population

*Specified Population:* A measurable group, defined by location, time, demographics, and other characteristics

**Example:** Women aged 45-54 living in a rural village in Country X from 2001 through 2009.

Epidemiology: CDC Definition
Application

*Application*
- Analysis, conclusion, distribution, and timely use of epidemiologic information to protect the health of the population
- **Example:** As a result of the Country X Study, free cervical cancer screening programs were implemented. They targeted women living in remote areas in hopes of finding women with cervical cancer at an earlier stage of cancer in order to prevent death.
**Purpose of Epidemiology**

- To measure frequency of disease
  - Quantify disease
- To assess distribution of disease
  - Who is getting disease?
  - Where is disease occurring?
  - When is disease occurring?
- To form hypotheses about causes and preventive factors
- To identify determinants of disease
  - Hypotheses are tested using epidemiologic studies

**Epidemiologic Assumptions**

- Diseases and other health-related events do not occur at random.
- Diseases and other health-related events usually have causal and preventive factors that can be found.

**Approaches in Medicine vs. Epidemiology**

<table>
<thead>
<tr>
<th>Approach/Consideration</th>
<th>Clinical Medicine</th>
<th>Epidemiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>Individuals</td>
<td>Populations</td>
</tr>
<tr>
<td>Main Goal</td>
<td>Diagnosis and treatment</td>
<td>Prevention and control</td>
</tr>
<tr>
<td>Questions</td>
<td>What is wrong with this patient?</td>
<td>What are the leading causes of death or disability in this population? Risk factors?</td>
</tr>
<tr>
<td>Treatment</td>
<td>What treatment is appropriate?</td>
<td>What can be done to reduce or prevent disease or risk factors?</td>
</tr>
<tr>
<td>Who is involved?</td>
<td>Physician, laboratorian, nurse, and others</td>
<td>Epidemiologist, statisticians, and others from diverse disciplines</td>
</tr>
</tbody>
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**Key Point:** Coordination between clinical practitioners and epidemiologists is critical; individual data or clinical data from the individuals needs to first be obtained from the clinical practitioners.
INTRODUCTION TO NCD EPIDEMIOLOGY

### Approaches to Epidemiology

1. **Descriptive Epidemiology**

2. **Analytic Epidemiology**

### Descriptive Epidemiology

- Studies the **pattern** of health events and their **frequency** in populations in terms of:
  - Person
  - Place
  - Time
- **Purpose:**
  - To identify problems for further study
  - To plan, provide, and evaluate health services

### Analytic Epidemiology

- Studies the **association** between **risk factors** and **disease**
- **Purpose:**
  - To determine why disease rates are high (or low) in a particular group
**Key Point:** Although there are only 4 steps in the cycle, there are many steps leading up to each. For example, you might test an intervention before you implement one.
Public Health Surveillance

Prevalence of Smoking
United States

Public Health Surveillance: CDC Definition

Ongoing, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.

Investigation
**Data Analysis**
- Describe the distribution of a health condition or event in a community
- Create a hypothesis about what causes or protects against disease or injury
- Learn about factors thought to be associated with disease
- Assess associations between risk factors and disease, using statistical methods
- Interpret results and disseminate information

**Key Point:** Epidemiology is used in the design and implementation of interventions by describing patterns of disease. This provides information on who, where, and when to focus interventions.

**Intervention**

**Evaluation**

**Key Point:** A process evaluation assesses the operation of the project while an outcome evaluation assesses changes in health.
Communication

Management and Teamwork
- Clinical Staff
- Epidemiologist
- Laboratory Technicians
- Sanitation
- Community

Review: Functions of Epidemiology
- Public Health Surveillance
- Investigation
- Data Analysis
- Intervention
- Evaluation
- Communication
- Management and Teamwork
Half-Truths and Misunderstandings

Everyone has to die of something

Half-Truths and Misunderstandings: Reality

Reality: death is inevitable but it does not need to be slow, painful, or premature

Skill Assessment

1. Work in small groups to complete the assessment.
2. Discuss a local health problem and describe which functions of epidemiology to use to address the problem.
3. Assign a member of your group to record your responses.
4. Spend 20 minutes completing the assessment.
5. Be prepared to share your work with the class.